PB85-214153

Superfund Record of Decision (EPA Region 9) Stringfellow Acid Pits Site Glen Avon, California, July 1984

(U.S.) Environmental Protection Agency
Washington, DC

17 Jul 84

U.S. Department of Commerce
National Technical Information Service
NTIS

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R09-84/007
July 1984

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EPA

Superfund Record of Decision:

Stringfellow Acid Pits Site, CA

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16. ABSTRACT

The Stringfellow Acid Pits site is located in Riverside County, five miles northwest of the City of Riverside and one mile north of the community of Glen Avon. The site was operated by the Stringfellow Quarry Company from August 21, 1956 to November 19, 1972 as a hazardous waste disposal facility. Approximately 34 million gallons of industrial wastes, primarily from metal finishing, electroplating and DDT production, were deposited in evaporation ponds on site. The disposal area totals 17 acres.

The selected interim remedial measure includes installation of an on-site pretreatment system consisting of lime precipitation for heavy metals removal and granular activated carbon treatment for organics removal. Pretreatment will be followed by discharge to a publicly owned treatment works (POTW) system. Also, additional interceptor and monitoring wells will be installed to extract contaminated down gradient ground water.

Key Words: Alternative Technology, Environmental Impacts, Off-Site Disposal, O&M Funding, Cost Estimates

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UNITED ST ES ENVIRONMENTAL PROTECTIO GENCY
WASHINGTON, D.C. 20460

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

JUL 17 1984

MEMORANDUM

SUBJECT: Authorization to Proceed with Remedial Action for the Stringfellow Site, California -- Record of Decision

FROM: William N. Hedeman, Jr., Director
Office of Emergency and Remedial Response

TO: Lee M. Thomas
Assistant Administrator

The attached Record of Decision is presented for your authorization of remedial action at the subject site.

We are asking your approval of the interim measure to install a treatment facility on-site to treat contaminated ground water from on-site and the mid-canyon area. Treated effluent would be trucked to a local sewer line drop point for disposal. Effluent would receive secondary treatment at the publicly-owned treatment works and then be discharged to the ocean. Sludge from the pretreatment process would be taken to a RCRA Class I land disposal facility.

Funding for design and some elements of construction is included in the FY 1984 Revised Remedial Accomplishments Plan.

Attachment

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 17 1984

MEMORANDUM

SUBJECT: Record of Decision for Approval of Remedial Action at the Stringfellow, California Site

FROM: Frank Biros, Director
Technical Division
Office of Waste Programs Enforcement (WH-527)

TO: William N. Hedeman, Jr., Director
Office of Emergency and Remedial Response (WH-548E)

The Record of Decision for the Stringfellow, California Site has been reviewed by my staff.

I Concur X

I Do Not Concur _____

I Concur With the Attached Conditions _____

Date 7-17-84

Comments:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE July 13, 1984

SUBJECT Recommendation for an Interim Offsite Control Measure for Stringfellow, Glen Avon, California

FROM John Wise
Deputy Regional Administrator, Region 9 (DRA)

TO Lee Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response (WH-562A)

Based on the Region's review of the May 18, 1984 report "Fast Track Remedial Investigation/Feasibility Study, Stringfellow Site", and other available information, I recommend that installation of a pretreatment plant followed by discharge to a Publicly Owned Treatment Works system be selected as the interim offsite control measure for the Stringfellow site. This alternative will provide cost-effective management and disposal of contaminated groundwater to protect public health and the environment during the three to five year interim period prior to completion of the full-scale RI/FS and implementation of the final remedy.

The California Department of Health Services concurs with this recommendation, and a letter stating their concurrence will be forwarded to your office within a few days.

Attachments

EPA Form 1320-6 (Rev. 3-76)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DATE July 12, 1984

SUBJECT Record of Decision
Stringfellow, Glen Avon, California

FROM Harry Seraydarian
Director, Toxics & Waste Management Division (T-1)

TO John Wise
Deputy Regional Administrator (DRA)

Attached for your review and signature is the cover memo and documentation for our recommended alternative for an interim offsite control measure at the Stringfellow site.

Based on the results of the Fast Track Remedial Investigation/Feasibility Study, the Toxics and Waste Management Division recommends installation of an onsite pretreatment plant for removal of heavy metal and organic contaminants, followed by discharge to a local Publicly Owned Treatment Works (POTW) system. Sludge from the treatment process will be deposited at a Class I facility. This alternative will be implemented during the three to five year interim period prior to completion of the full-scale RI/FS and implementation of the final remedy.

Of the alternatives evaluated, this alternative is the lowest cost and provides the greatest protection to public health, welfare and the environment. This alternative is supported by the community of Glen Avon and the California Department of Health Services (DOHS).

The Santa Ana Watershed Project Authority (SAWPA), a local POTW, has submitted a proposal to DOHS for implementation of the recommended alternative. In anticipation of EPA's approval, DOHS has entered into a preliminary contract with SAWPA for this purpose. DOHS is aware that EPA may not pay for any expenses incurred prior to selection of a remedy through the Record of Decision process.

In addition to the documentation of this recommendation, a letter of concurrence to be signed by William Hedeman and the actual Record of Decision to be signed by Lee Thomas are included in this package.

If you have any questions concerning this packet of materials, I will be happy to meet with you at your request.

Attachments

Record of Decision
Remedial Alternative Selection

SITE: Stringfellow Acid Pits, Glen Avon, California

DOCUMENTS REVIEWED

My decision is based in part on review of the following documents describing the analysis of cost-effectiveness of remedial alternatives for the Stringfellow site:

- Stringfellow Site Fast Track Remedial Investigation/ Feasibility Study, CH2M Hill, May 18, 1984

- Summary of Remedial Alternative Selection

- Responsiveness Summary

- Final Draft Stringfellow Summary Report, Ecology and Environment Inc., May 16, 1984

DESCRIPTION OF SELECTED REMEDY

- Installation of an on-site pretreatment system consisting of lime precipitation for heavy metals removal followed by granular activated carbon treatment for organics removal. Pretreatment will be followed by discharge to a publicly owned treatment works (POTW) system

- Operation requirements include: Chemical and carbon replacement, monitoring, electricity, labor, transportation of treated effluent to a POTW sewer drop point and disposal of contaminated sludge at a Class I facility.

- Installation of additional interceptor and monitoring wells to extract contaminated groundwater downgradient of the site.

DECLARATIONS

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), and the National Contingency Plan (40 CFR Part 300), I have determined that the installation of a pretreatment system at the Stringfellow site is a cost-effective interim measure and provides adequate protection of public health, welfare and the environment. The State of California has been consulted and agrees with the approved remedy. In addition, the action will require operation activities to ensure the continued effectiveness of the remedy. These activities will be considered part of the approved action and eligible for Trust Fund monies until implementation of the remedial action for final site closure. The State will apply for operation funds on an annual basis.

I have also determined that the action being taken is appropriate when balanced against the availability of Trust Fund monies for use at other sites. In addition, the off-site transport of sludge and pretreated effluent is more cost-effective than other remedial actions, and is necessary to protect public health, welfare, or the environment.

The State of California is currently conducting a full-scale Remedial Investigation/Feasibility Study to identify and evaluate methods to prevent or manage upstream groundwater and surface water entering the site, to prevent migration of hazardous substance off-site, to define aquifer characteristics, the extent of the contaminant plume, and methods of controlling migration. A cost-effective remedial action for final site closure will be developed. If additional remedial actions are determined to be necessary, a Record of Decision will be prepared for approval of future remedial actions.

7/18/84
Date

Lee M. Thomas
Assistant Administrator
Office of Solid Waste and Emergency Response

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

STRINGFELLOW ACID PITS
Glen Avon, California

SITE LOCATION AND DESCRIPTION

The Stringfellow site is located in Riverside County, approximately five miles northwest of the City of Riverside and one mile north of the community of Glen Avon. The site is located at the head of Pyrite Canyon which lies in the southern portion of the Jurupa Mountains, approximately 4,500 feet north of the intersection of U.S. Highway 60 and Pyrite Street. The canyon opens into the town of Glen Avon, south of U.S. Highway 60. (See Figure 1.)

The watershed area tributary to the disposal site is approximately 270 acres. Groundwater beneath the site moves in a semi-confined aquifer bounded by canyon walls to the north, east and west. Water flows toward the south, exiting the canyon just north of Highway 60 and then enters the Chino Basin regional groundwater system which travels toward the southwest. The Chino Basin system provides a domestic drinking water supply for approximately 40,000 potentially affected residents. The groundwater supply is also used for industrial and agricultural purposes. Surface runoff from the canyon moves southwesterly from the site and collects in a culvert drop box just north of Highway 60. Surface runoff then flows under the highway through Glen Avon in lined and unlined channels, and eventually to the Santa Ana River, a total distance of approximately 7 miles.

The site is surrounded by undeveloped land which is primarily used as range land. An operating quarry is located about a quarter of a mile downgradient of the site on the western side of the canyon.

SITE HISTORY

The site was operated by the Stringfellow Quarry Company from August 21, 1956 to November 19, 1972 as a hazardous waste disposal facility permitted by the Santa Ana Regional Water Quality Control Board (RWQCB). Approximately 34 million gallons of industrial wastes, primarily from metal finishing, electroplating and DDT production, were deposited in evaporation ponds on the site. Site operations also included spray evaporation of pond contents to accelerate volume reduction. The total disposal area was approximately 17 acres. The site was voluntarily closed in 1972.

In 1969 and 1978, excessive rainfall caused the disposal ponds to overflow. The overflows extended south of Highway 60 into Glen Avon. In 1980 and 1981, the RWQCB implemented an Interim Abatement Program at the disposal site as the first phase of site closure. The program included removal of all surface liquids, partial neutralization and capping of the wastes, installation of a gravel drain and a network of extraction, interceptor and monitoring wells onsite and downgradient of the site, diversion of surface water around the site via gunite channels, and construction of a clay core barrier dam and leachate colecton system downgradient of the disposal ponds to stop migration of subsurface leachate.

For a more detailed description of previous response actions and enforcement activities, please refer to the July 22, 1983 Stringfellow Record of Decision briefing documents. The following paragraphs describe the response actions performed since May, 1983. Enforcement activities are discussed in detail in the Enforcement section.

State-lead Activities

A $2.8 million cooperative agreement was awarded to the State of California on July 28, 1983, and a $7.1 million Amendment was awarded on December 28, 1983 for the Stringfellow site. Activities funded include initial remedial measures (IRM), interim source control measures, interim offsite control measures, a remedial investigation/feasibility study (RI/FS) and reimbursement for Interim Abatement Program activities.

Initial remedial measures funded under the cooperative agreement include erosion control and fencing. Erosion control measures were completed in November 1983, and a fence will be constructed around the site in August, 1984.

Interim source control measures include extraction and offsite disposal of contaminated groundwater. Groundwater is pumped from extraction facilities and routed to a series of holding tanks. It is then transfered to trucks for transport to a Class I disposal site. Since July, 1983, groundwater has been extracted from three onsite wells (OW-1, OW-2, OW-4) and two downgradient sources (the french drain and IW-1) in order to intercept the flow of contaminated groundwater from the disposal area and to prevent their migration down the canyon. Between July, 1983 and March, 1984, approximately 150,000 gallons of groundwater was extracted per week.

On March 23, 1984, EPA Headquarters authorized extraction and disposal of groundwater from two mid-canyon wells (IW-2 and IW-3). Since that time, a total of approximately 200,000 gallons per week of groundwater has been extracted from the onsite and downgradient facilities.

JRB Associates was selected by the California Department of Health Services (DOHS) to conduct the RI/FS. The contract was signed on March 26, 1984. The study is scheduled to be completed on October 15, 1985. The RI/FS will recommend a cost-effective remedy for final site closure.

EPA-lead Activities

To assist the State prior to commencement of the RI/FS and other cooperative agreement activities, and for the purpose of enforcement support, EPA has undertaken the following activities since April, 1983: emergency response actions, monthly sampling program, electro-magnetic conductivity survey, installation of new monitoring wells, the Fast Track RI/FS, treatability studies and pilot tests of the mid-canyon extraction well field. The Fast Track study is the basis for this Record of Decision. In addition, EPA has entered into an Interagency Agreement with the US Army Corps of Engineers (USACE). The USACE will provide technical assistance during Remedial Design and the full-scale RI/FS.

- Emergency Response: In May, 1983, contaminated liquid was discovered surfacing several hundred yards below the barrier dam. The contaminated liquid mixed with surface water which is channeled around the site. DOHS authorized construction of an open pit to collect leachate and pumping of contaminated liquids to onsite holding tanks. Contaminated liquid was disposed of offsite together with the extracted groundwater described previously.

  In May, 1983, DOHS requested EPA assistance for containment action. Between May and November, 1983, Region 9's Emergency Response Team with assistance from the USCG Pacific Strike Team performed the following activities: installation of a french drain in the seepage area with a sump to collect liquids and automatically pump liquids to the holding tanks, improvement of drainage channels consisting of grading, trenching and paving, installation of an upgradient spring box and installation of upgradient "pump barrel" sumps to collect and divert uncontaminated groundwater around the site.

- Monthly Sampling Program: EPA's contractor, Ecology and Environment (E & E), conducted monthly groundwater sampling of extraction, interception, monitoring, and private wells from April through September and November, 1983.

- Electro-magnetic Conductivity Survey: In June, 1983, E & E conducted an electro-magnetic (EM) conductivity survey to delineate areas of high ionic concentration in groundwater

which may be related to inorganic contamination. The survey results indicated that the extent of the groundwater contamination plume may not have been detected by the existing monitoring wells. E & E recommended the installation of 4 new monitoring wells to confirm the results of the EM survey.

- New Monitoring Wells: During September and October, 1983, E & E installed 4 monitoring wells in the lower Pyrite Canyon area based on the EM survey.

- Fast Track RI/FS: The State requested that an EPA-lead Fast-Track RI/FS be conducted to identify and evaluate alternatives to current groundwater extraction and offsite disposal operations. Originally, this activity was included as Tasks IX and X in the full-scale RI/FS funded under the cooperative agreement. The selected alternative, or interim measure, would be implemented during the 3 - 5 year period prior to completion of the full-scale RI/FS and implementation of the final remedy. This activity, conducted by CH2M Hill, was intiated in September, 1983. The final report, issued on May 18, 1984, is the basis of this Record of Decision.

- Treatability Studies: Since June 4, 1984, CH2M Hill has performed laboratory characterization and treatability testing on Stringfellow water to verify the capability of the pretreatment system recommended in the Fast Track report to meet pretreatment objectives, and to confirm operating cost estimates.

- Pilot Pumping Test: In early July, 1984, CH2M Hill performed pilot tests of the mid-canyon groundwater interception well system to verify the long-term pumping rate required to effectively intercept contaminated groundwater moving through the mid-canyon area.

CURRENT SITE STATUS

Hazardous Substances Present

Table 1 presents a summary of the concentration ranges for major contaminants present in the groundwater at the Stringfellow site. Analytical results for upgradient water are from spring water samples collected north of the disposal area; this is an indicator of background levels of groundwater constituents in Pyrite Canyon.

High concentrations of heavy metals present in the contaminated groundwater found onsite include chromium, cadmium, copper and zinc. In samples collected from onsite wells, nitrate, sulfate and chloride levels are one to two orders of magnitude higher than background samples. Onsite water ranges in pH from 2.6 to 4.1, significantly more acidic than upgradient water (pH 7.0 to 7.2). A wide range of organic pollutants are present in the

TABLE 1

CONCENTRATION RANGES FOR SELECTED CONSTITUENTS

	UPGRADIENT	ON-SITE	UPPER CANYON	MID CANYON	LOWER CANYON		PRIVATE WELLS
					West Side	East Side	
	Springs Above Disposal Area	OW-1,2,4	IW-1, MW-3B 4B, 5B, 6B	IW-2, 3 MW-1B, 2B, 7B, 8B, 9B, 13B	MW-10B, 11B, 12B	MW-14B, 15B, 16B, 17B, 18B	See Figure 5-1 Table 5-1
Inorganics (mg/l)							
Chromium	ND	1.5-270	ND-170	ND-2.4	ND	ND-0.046	ND-0.74 (1)
Cadmium	ND	0.32-7.3	ND-9.3	ND-3.4	ND	ND	ND-0.006
Copper	ND	1.7-20	ND-28	ND-0.26	ND-0.059	ND	ND-0.11
Lead	ND	ND-25	ND-2.7	ND-1.70	ND	ND	ND
Manganese	0.022-0.75	100-380	ND-1200	ND-385	ND-0.14	ND-0.52	ND-3.3
Zinc	ND-0.028	2.2-110	ND-300	ND-29	ND-0.245	ND-0.09	ND-5.6
Nitrate-N	ND-3.9	8-120	10-100	ND-115	9.6-26	ND-98	2.4-130
Sulfate	ND-325	3200-38000	1000-30000	170-27000	180-1500	100-1300	45-430
Chloride	41-70	93-5800	245-4000	60-850	37-310	45-300	26-330
*pH	7.0-7.2	2.6-4.1	2.7-6.5	3.0-7.3	6.5-7.6	6.8-7.6	6.2-8.1
Organics (ug/l)							
Phenol	ND	ND-640	ND-1600	ND-<100	ND-<10	ND	ND
1,2-Dichlorobenzene	ND	120-3800	170-2400	ND-400	ND-12	ND-<20	ND
1,4-Dichlorobenzene	ND	59-1200	78-660	ND-74	ND-<10	ND	ND
Isophorone	ND	190-3600	ND-5100	ND-340	ND	ND	ND
Chlorobenzene	ND	290-1800	50-1200	ND-140	ND-<5	ND-<5	ND
Chloroform	ND	150-900	100-1800	ND-1200	ND-6	ND-32	ND
Ethylbenzene	ND	<50-260	ND-150	ND-14	ND	ND	ND
Methylene Chloride	ND	ND-9200	ND-17000	ND-3600	ND	ND-18	ND-420 (2)
Tetrachloroethylene	ND	<50-510	ND-63	ND-8	ND	ND-<5	ND-6
Toluene	ND	140-2400	ND-1300	ND-160	ND-<5	ND-<5	ND
Trichloroethylene	ND	4200-15000	1300-10000	ND-5300	ND-31	ND-730	ND
Acetone	ND	ND-5500	ND-28000	ND-2000	ND	ND-17	ND-87 (3)
2-Butanone	ND	ND-10000	ND-77000	ND-3500	ND	ND	ND
4-Methyl-2-Pentanone	ND	430-11000	ND-21000	ND-2000	ND	ND	ND
4,4'-DDT	ND	ND-0.54	ND	ND	ND	ND	ND
4,4'-DDE	ND	ND-0.19	ND-0.16	ND-0.06	ND	ND	ND

Key

ND -, Not Detected
* pH Units,

1 Subsequent sampling has shown no detectable quantities of chromium in any of the private wells.

2 420 ug/l was reported in a single instance. No methylene chloride has been detected in any of the private wells at any other time.

3 Subsequent sampling of private wells has shown no detectable quantities of acetone

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onsite and downgradient groundwater. The organic pollutants in the greatest concentrations are 1,2-dichlorobenzene, isophorone, methylene chloride, trichloroethylene (TCE), chloroform, acetone 2-butanone, and 4-methyl-2-pentanone. Traces of pesticides (4,4'-DDT and 4,4'-DDE) are also present.

Recent analytical work performed by the National Enforcement Investigation Center (NEIC) has revealed chlorobenzenesulfonic acid (CBSA) as a contaminant in the groundwater at Stringfellow. Analysis for this substance had not been performed previously because it is not a priority pollutant. Concentrations of CBSA were as high as 2000 mg/l in samples taken from onsite wells. CBSA is an industrial by-product of DDT production and is usually found in the sulfuric acid wastes from this process. Relatively little toxicological data exists for CBSA and an analytical protocol is being developed. Analysis for CBSA will be included in the next monthly sampling effort.

NEIC's analysis also revealed gross alpha radiation levels ranging from 38 to 672 picocuries/liter in sampes take from onsite wells and IW-2 and IW-3 (see Figure 2). To follow-up on these findings, DOHS is conducting sampling of upgradient, on-site, downgradient and Glen Avon community wells to determine the extent and source of radiation contamination. Two hundred and twenty-six samples have been taken following a door-to-door canvass of 1600 residences and businesses in Glen Avon to locate wells.

On June 11 and 12, 1984, samples were taken from three large water purveyors in Glen Avon. Radiation analyses conducted by the Department's Sanitation and Radiation Laboratory show that the water delivered by these systems meets the State and Federal drinking water standards for radioactivity. Results of analyses performed on samples from 14 domestic wells taken the week of June 6, 1984, show gross alpha activity ranging from negligible to 31.3 picocuries per liter. Two of these domestic wells are in compliance with Federal drinking water standards for gross alpha radiation; further analysis must be conducted on the other twelve samples.

As a precautionary measure until the sampling and analysis is complete, DOHS is providing bottled water to approximately 300 Glen Avon households who normally obtain their drinking water from private wells or from the small public water purveyor, Felspar Gardens Mutual Water Company. Bottled water is being paid for through emergency provisions of the State's Superfund program.

Extent of Contamination

Information on groundwater quality consists primarily of analytical results from samples collected by E & E during 1983. Samples were collected from 3 extraction wells (OW-1, OW-2, OW-4), 3 interceptor wells (IW-1, IW-2, IW-3), 18 downgradient monitoring wells, and private wells in the community of Glen Avon. (Refer to Figures 1 and 2.)

A report issued by E & E in May, 1984, concludes:

- TCE is the primary organic contaminant present in groundwater downgradient of the disposal area. Organic contaminants other than TCE and chloroform have attenuated significantly before reaching lower Pyrite Canyon.

- Downgradient migration of significant quantities of metals is confined to the upper and mid-Pyrite Canyon areas (approximately 1,200 feet offsite).

- Sulfates and chlorides have migrated to the lower canyon area. No contamination related to the disposal site has been detected in any of the private wells included in the monitoring program.

- The main axis of the contaminant plume appears to run along the eastern side of lower Pyrite Canyon past MW-15B and MW-17B.

- Data concerning vertical stratification of contamination suggests that contamination is distributed throughout the aquifer thickness.

The full-scale RI/FS will obtain information necessary to better define the potential areal and vertical extent of the groundwater contaminant plume.

Pathways of Migration

Interpretation of the EM conductivity survey suggests that plume movement is strongly controlled by the location of buried channels in the alluvium.

Alluvium is probably the main water-bearing material in Pyrite Canyon. The alluvium is permeable and varies in thickness from 10 feet at the south end of the site to 80 feet at the mouth of the canyon. The alluvium in the lower parts of the canyon is made up of distinct layers of clay, sand and gravel as opposed to its more heterogeneous nature in upper parts of the canyon. Older alluvium rests on the weathered bedrock surface and consists primarily of dense sand with gravel and boulders of highly weathered granodiorite.

No information is available on the water-bearing characteristics of the weathered, fractured, and jointed bedrock, but water could be contained within these features, and, if inter-connected these features may transmit water for certain distances. A detailed investigation of alluvium and bedrock pathways of migration will be conducted in the full-scale RI/FS.

The depth to groundwater ranges from 10 to 40 feet. Groundwater velocity ranges from 50-3,500 ft/year depending on location. Velocity is lowest in the silty, clayey sediments near the canyon walls and highest in the central portion of the valley. The average groundwater velocity is estimated to be about 1,200 ft/yr. In the mid-canyon area, average groundwater underflow is estimated to 40 gpm.

Potential receptors

Numerous private wells are located downgradient of the site. In a recent survey of the private wells in Glen Avon, over 200 private wells were located directly downgradient of the site. Groundwater exiting the canyon mixes with the Chino Basin aquifer which provides a domestic drinking water supply for approximately 40,000 potentially affected residents and is used for industrial and agricultural purposes.

Exposure Potential

Section 300.68(e) of the National Contingency Plan (NCP) directs that the extent to which contamination poses a danger to public health, welfare, or the environment be assessed in order to determine the appropriateness of proposed remedial actions. In order to comply with this requirement, an endangerment assessment of the groundwater conditions in the vicinity of IW-2 and IW-3 was conducted to determine the extent to which contamination poses a danger to public health, welfare or the environment. The endangerment assessment addressed the likelihood that contaminated groundwater will reach downgradient domestic wells within the next three years. This is the minimum time anticipated before final remedies can be implemented.

For the purpose of the endangerment assessment, 8 key constituents were identified: trichloroethylene (TCE), chloroform, cadmium, chromium, methylene chloride, isophorone, lead, and nitrate.

Because TCE and chloroform are mobile in the groundwater environment, they present the greatest immediate danger to downgradient groundwater users. Their presence has been verified 4,000 feet south of the disposal area.

Monitoring well data shows TCE levels consistently above the California action level of 5 ug/l and EPA's 10^{-6} Water Quality Criteria of 2.7 ug/l. Chloroform has been found at levels consistently above the State action level of 2 ug/l and EPA's 10^{-6} Water Quality Criteria of 0.19 ug/l in all but one well.

The highest average values found of TCE and chloroform are 1,600 ug/l and 230 ug/l, respectively.

TCE is a halogenated hydrocarbon of relatively low acute toxicity, but in high doses can cause central nervous system depression, long-term neurological effects, dermatitis, and peripheral neuropathies. Liver toxicity has been observed in high dose animal studies and in humans at anesthetic doses. The status of TCE as a potential human carcinogen is not fully resolved, but is a proven animal carcinogen. Chloroform can cause nausea, dizziness, and acute central nervous system depression. Chloroform can also cause chronic liver and kidney damage.

Heavy metal contamination can cause damage to the central nervous system, liver, kidneys, gastrointestinal tract and respiratory tract. Some of the heavy metals identified for the have been found to be carcinogenic, teratogenic and/or mutagenic.

Calculations of contaminant movement were made in the endangerment assessment. Based on anticipated dilution effects, it is estimated that in 2.5 years the levels of TCE in the area of the nearest domestic well (3,200 feet downgradient from IW-2 and IW-3) could be between 150 and 800 ug/l and the levels of chloroform could be between 20 and 110 ug/l. These levels are much higher than the action levels; therefore, it was concluded that a significant threat to public health exists due to groundwater contamination from the site.

The results of the endangerment assessment show the need for interim extraction of contaminated groundwater from mid-canyon prior to completion of the full-scale RI/FS and implementation of the final remedy. This interim measure will effectively prevent migration of contaminants toward domestic wells downgradient of the site and will thereby abate the threat to public health.

A comprehensive health assessment is currently being conducted by DOHS and a more comprehensive endangerment assessment may be performed during the full-scale RI/FS.

ENFORCEMENT

Potentially Responsible Parties (PRP)

In August and October, 1982, EPA issued over 200 combination CERCLA section 104/RCRA section 3007 Notice Letters to potentially responsible parties. The government negotiation team which consists of EPA, DOHS, the United States Department of Justice (DOJ), and the State of California Attorney General held a general meeting with potentially responsible parties in November, 1982. The purpose of this meeting was to initiate enforcement discussions with potentially responsible parties to recover past

and future costs of cleanup. On April 21, 1983, the United States and the State of California filed a civil suit in the United States District Court for the Central District of California. Eighteen generators, 4 transporters, and 9 owner/operators were named as defendants in the lawsuit.

A record of disposal activities at the Stringfellow site exists in 35,000 pages of Stringfellow business records. NEIC has had this information put into a computer data base and is able to generate summaries of the information.

Litigation Status

- Discovery

The case is presently in the discovery phase of litigation. Both the defendants and the plaintiffs have, and continue to, produce documents, propound interrogatories, and conduct depositions. Additionally, the plaintiffs have served requests for admissions on defendants; these requests are for admission that the Stringfellow business records are genuine and admissible documents.

- Settlement

In October, 1983, the United States presented two settlement options to defendants. Option 1 would allow the potentially responsible parties to perform the RI/FS and to implement the resulting remedial actions, both under the supervision of EPA and the State. Option 2 would allow EPA and the State to perform the RI/FS and to implement the resulting remedial actions; the defendants would pay 100% of the cost. The defendants settlement negotiations. EPA has offered to resume settlement discussions at any time convenient to the defendants.

- Motions

Judge Malcolm Lucas issued his ruling on the issue of Joint and Several Liability on April 6, 1984. The ruling grants Joint and Several under CERCLA §107, but needs further clarification on the applicability of Joint and Several under CERCLA §106.

As with the ruling on Joint and Several Liability, the ruling on Retroactivity will need further clarification before a full understanding of its implications is realized.

The motion for intervention, submitted by members of the community, was granted as permissive intervention with conditions. The appeal on this ruling was denied by the court.

The Court has issued ambiguous rulings on the issues of joint and several liability and retroactivity. A status conference before a newly assigned judge was heard on June 18, 1984. The Court has set August 20, 1984 as the deadline for the filing of future motions; motions filed by this date will be heard on October 1, 1984. EPA and the State are considering filing motions for partial summary judgment and issuing an administrative order under CERCLA §106.

ALTERNATIVES EVALUATION

Remedial Objectives

The objective of the Fast Track RI/FS is to identify an interim measure that would prevent migration of additional contaminated groundwater past mid-canyon and, as a result, would prevent adverse public health and environmental impacts during the 3 - 5 year period prior to completion of the full-scale RI/FS and implementation of the final remedy. The measure should provide cost-effective management for disposal of groundwater collected from onsite and downgradient wells.

Alternatives Considered

The following interim remedial actions were considered:

- No action
- Discharge to a publicly owned treatment works (POTW)
- Pretreatment followed by discharge to a POTW
- Reinjection (either onsite or offsite)
- Treatment followed by reinjection
- Solar evaporation
- Incineration
- Surface discharge
- Treatment followed by surface discharge
- Disposal at a Class I land disposal site
- Disposal at a Class II-1 land disposal site
- Disposal at a permitted hazardous waste treatment facility
- Reuse as industrial process water
- Future treatment of drinking water at the tap

Initial Screening of Alternatives

As required by the National Contingency Plan, (40 CFR 300.68(h)), the above alternatives were initially screened using the criteria of estimated cost, effects of the alternative, and acceptable engineering practices. The following alternatives were eliminated from further consideration:

- No Action

As required by Section 300.68 (e) of the NCP, an assessment of the groundwater conditions was conducted to determine the extent to which continued migration of groundwater contamination poses a threat to public health, welfare, or the environment. The endangerment assessment addressed the likelihood that contaminated groundwater will reach downgradient domestic wells within the next three years. This is the minimum time anticipated before a final remedy can be implemented. Based on findings of the endangerment assessment, it was concluded that a significant threat to public health from migration of contaminated groundwater would exist within 2.5 years if no interim action were taken. (Refer to pages 7 and 8 for a discussion of public health concerns.) Therefore, the "no-action" alternative was eliminated from further consideration.

- Discharge to a Publicly Owned Treatment Works Without Pretreatment

Two POTW systems were identified as tentatively suitable for receiving extracted groundwater. Each POTW has water quality limitations for industrial wastes discharged to its system. Because untreated Stringfellow water exceeds the water quality limitations of both systems and could not be discharged to either without pretreatment, this alternative was eliminated.

- Reinjection Without Treatment

Geologic and hydrogeologic data required for implementation of this alternative is unavailable at this time. Aquifer characteristics will be fully studied in the full-scale RI/FS and this alternative may be reconsidered at that time. However, without adequate knowledge of the hydrogeology of the area, reinjection could actually accelerate migration of contaminated groundwater. Therefore, this alternative is unacceptable at this time.

- Treatment Followed by Reinjection

As with the alternative, "Reinjection Without Treatment", extensive geologic and hydrogeologic information is required in order to assess the impacts of this alternative. This information is not currently available. This alternative may be reconsidered in the full-scale RI/FS but is unacceptable at this time.

- Solar Evaporation

No suitable land area was identified. Establishment of surface impoundments for solar evaporation either in Pyrite Canyon or elsewhere in the vicinity was judged to be unacceptable to the surrounding community. It should be noted the existence of the

Stringfellow site as an uncontrolled hazardous waste site is due to a failed attempt at solar evaporation. Community and local agency opposition to a second attempt at onsite solar evaporation was anticipated to be strong and could preclude timely implementation of this alternative.

- Incineration

EPA is unaware of any suitable incineration facilities in close proximity to the site, thus a facility would have to be constructed onsite. Since prefabracated components for this type of facility are not available, the extensive time requirements for design and construction render this alternative inappropriate as an interim solution. Due to the complexity of this type of facility, the capital costs of construction would be high; due to the low heating value of water, energy costs would be prohibitively expensive.

- Surface discharge

Surface discharge of extracted contaminated ground water could cause extensive surface water and soil contamination and would violate existing water quality criteria. This alternative may not mitigate the current ground water problem table resulting in even further migration of the contaminant plume. In addition, it presents a threat to public health as a result of consumption of or direct contact with contaminated water.

- Treatment Followed by Surface Discharge

A pretreatment facility would be built on-site. Treated effluent would be discharged to Pyrite Creek which flows through the community of Glen Avon in lined and unlined channels to the Santa Ana River. This alternative would require extensive removal of contaminants to meet existing water quality criteria due to the low dilution capacity of Pyrite Creek. The costs associated with this level of treatment would be high. In the event of a treatment system failure, a release of contaminated water could result in surface water and soil contamination, and could create a potential threat to public health due to volatilization of organics and the potential for consumption of or direct contact with contaminated water.

- Disposal at a Permitted Hazardous Waste Treatment Facility

There is one permitted hazardous waste treatment facility in southern California. Treatment at the facility consists of

neutralization, settling, and sludge dewatering. Dewatered sludge is disposed of onsite and treated effluent is discharged to an industrial sewer which connects to a POTW. The facility's treatment process for contaminated groundwater from the Stringfellow site may not produce an effluent which would comply with the POTW pretreatment standards since the process is not designed to remove organic contaminants. Moreover, the facility's limited capacity and current customer loading makes it inadequate for expected Stringfellow quantities.

- Reuse as Industrial Process Water

Demand for contaminated water in industrial facilities is limited. EPA is unaware of any industrial facility in close proximity to the site that could use contaminated water. In addition, this alternative may present a public health hazard due to the potential for employee exposure to volatile emissions from the contaminated water. Furthermore, a potential exists for mishandling the contaminated wastewater after it has been used as process water. Thus, this alternative may present a threat to public health and the environment.

- Future Treatment of Drinking Water at the Tap

This alternative does not achieve the remedial objectives of preventing the migration of additional contaminated groundwater, thus the entire Chino Basin aquifer may ultimately be contaminated. As a result, an expanded tap water treatment program would be required. This alternative would not alleviate environmental problems and may worsen long-term problems by allowing further contamination of the groundwater basin.

Detailed Description of Remaining Alternatives

The remaining alternatives were evaluated regarding their effectiveness in meeting the remedial objectives of the Fast-Track RI/FS and on the basis of cost. In addition to operation of the existing facilities, as proposed in the Fast Track, the following components are common to all three of the remaining alternatives:

- Storage Tanks and Containment Structure

In order to effectively intercept contaminated groundwater in the mid-canyon, the Fast Track determined that groundwater should be extracted at an average rate of 40 gpm. An additional 200,000 gallons of onsite storage capacity is needed to accomodate the total flow. This will provide 3 days of storage capacity. In addition, it is necessary to install a concrete containment structure around the storage tanks to prevent flow of contaminated water down the canyon in the event of a spill and to divert storm runoff from the storage tank area. Design and construction of storage tanks and a containment

- Gunite Channels

In order to alleviate the existing surface water runoff and soil erosion problems, the existing eastern and western gunite channels should be extended. Specifically, the eastern channel should be extended past the Baker tanks and a culvert should be installed beneath the road to carry runoff. The western channel should be extended to connect with flows from the east prior to discharge to Pyrite Creek. (See Figure 2.) Extension of the gunite channels and installation of a culvert is estimated to cost $110,000.

- Piping

The piping for conveying flow from the spring upgradient of the site to the eastern gunite channel is damaged and causes a surface runoff and infiltration problem. A permanent conveyance consisting of new piping extending all the way to the channel is required. (See Figure 2.) The estimated cost of this component is $3,500.

- Interceptor and Monitoring Wells

Additional interceptor and monitoring wells are required to assure effective interception of contaminated groundwater in the mid-canyon area. The estimated cost of this component is $110,000.

A description of the three remaining alternatives follows:

- Alternative 1: Pretreatment Followed by Discharge to a POTW

A pretreatment facility would be constructed at the Stringfellow site. The treated effluent would be trucked to a local POTW system drop point for discharge effluent would receive secondary treatment at the POTW. The sludge would be disposed of at a Class I facility. The POTW system which receives the pretreated water would establish the level of pretreatment through the issuance of a discharge permit.

The Los Angeles County Sanitation District (LACSD) and the County Sanitation Districts of Orange County (CSDOC) were identified as candidates for disposal of pretreated Stringfellow water because they have marine discharge points and system drop points close to the site (less than 15 miles).

The Chino Basin Municipal Water District (CBMWD), which discharges to the LACSD, and the Santa Ana Watershed Project Authority (SAWPA), which discharges to the CSDOC, have established discharge requirements. Contaminated water at the site bears similarities to metal finishing industry wastewater,

containing both heavy metals and organic solvents. In absence of categorical treatment requirements, the most stringent requirements of CBMWD, CSDOC, SAWPA and EPA PSNS (pretreatment standards for new sources) were set as goals to be met by the recommended alternative. Table 2 summarizes these pretreatment objectives.

Before this alternative could be fully evaluated and cost estimates prepared, a review of treatment technologies was conducted to determine the optimal pretreatment process for Stringfellow groundwater. Based on the types and locations of contaminants present at the site, two basic treatment operations would be required to satisfy the discharge objectives identified. These operations are heavy metals removal and organics removal.

The basic technologies for removal of heavy metals are precipitation and concentration. The following treatment processes were evaluated: alkaline precipitation, sulfide precipitation, ion exchange and reverse osmosis. The following organics removal treatment technologies were evaluated: stripping, oxidation, adsorption, solvent extraction and membrane separation.

Based on an analysis of complexity of operation, probability of achieving desired removal, relative capital costs, relative operation and maintenance costs, potential operating problems, and types and potential volumes of residues generated, it was determined that the most effective system for treating Stringfellow groundwater would consist of lime precipitation for heavy metals removal followed by granular activated carbon treatment for organics removal. (For a discussion of the different treatment technologies, refer to the Final Fast Track RI/FS.) Thus, this system was used as a basis for evaluating this alternative.

- Alternative 2: Disposal at a Class I Land Disposal Site

The current practice of hauling extracted groundwater to a Class I disposal site would be continued. Class I disposal sites are State-licensed facilities permitted to accept the broadest categories of hazardous wastes. Stringfellow groundwater is currently disposed of at the Casmalia Resources, Inc. facility in Santa Barbara County, a distance of about 210 miles from the Stringfellow site.

- Alternative 3: Disposal at a Class II-1 Land Disposal Site

Extracted groundwater would be disposed at a Class II-1 disposal site. Class II-1 land disposal sites are State-licensed facilities permitted to accept prescribed quantities of specified waste types. From a list of all of the II-1 facilities in California, only two sites have been identified as potentially suitable sites based on capacity, and types of

TABLE 2

PROPOSED PRETREATMENT OBJECTIVES

Constituent	Maximum Conc. (mg/l)
Arsenic	2
Cadmium	0.11
Chromium (T)	0.5
Copper	2
Lead	0.69
Mercury	0.03
Nickel	3.98
Silver	0.43
Zinc	2.61
Cyanide (Total)	1.20
Cyanide (Amenable)	1
PCB's & Pesticides	0.02
Total Toxic Organics	0.58
Sulfide (Total)	5
Sulfide (Dissolved)	0.5
Oil or Grease	100
BOD	250
COD	5000
TSS	300
pH	6-9 (pH units)

waste accepted. These facilities are operated by Environmental Protection Corporation (EPC). Facilities at both sites consist of lined surface impoundments for solar evaporation. Remaining solids and sludges are landfilled in a lined disposal area. These facilities are approximately 170 miles from the Stringfellow site.

Detailed Evaluation of Alternatives

The effectiveness of these alternatives was evaluated on the basis of cost, public acceptability, public health, environmental and technical considerations. Eight criteria were developed to evaluate these factors:

- Time: How much time is required to implement the alternative?

- Compatibility: Can the alternative be easily adapted to the final remedy to be identified in the full-scale RI/FS (i.e., could it be modified or discontinued easily)?

- Reliability/Risk of Failure: How reliable would the alternative be based on the operating characteristics of the processes and equipment involved? This criterion applies to the technology status of processes used onsite and at the receiving facility.

- Level of Site Cleanup: To what degree will the alternative achieve site cleanup?

- Community Impact: Will the alternative have an acceptable effect on the residents of Glen Avon and other potentially affected communities?

- Technology Status: Is the technology well-established or experimental? This criterion applies to the technology status of processes used on-site and at the receiving facility.

- Potential Environmental Impacts: What environmental impacts, either positive or negative, would be expected to result from the alternative? This criterion applies to the potential environmental impacts as a result of operations at the site, during transport and at the site of ultimate disposal.

- Complexity of Operation: How difficult would it be to operate the components of the alternative? This criterion applies to the complexity of operations at the site and at the receiving facility.

- Cost: Annual and total three-year cost estimates were developed for each of the three alternatives because the selected alternative will be used on an interim basis until a final remedy is implemented.

A summary effectiveness evaluation and estimated cost for each alternative is presented in Table 3. A comparative evaluation of the alternatives follows:

- Time

  Alternative 2 has an advantage over the other two alternatives for time to implement since it is currently being practiced on a reduced scale. Implementing this alternative would require contracts for more trucks to transport the additional flow and to install additional storage capacity. It is estimated that this alternative could be implemented in 2 to 4 months.

  As with Alternative 2, implementation of Alternative 3 would require installation of additional storage capacity and obtaining additional hauling trucks. In addition, it may be necessary to amend the current hauling contract to specify a new destination and negotiations must be conducted with the II-1 facility. It is estimated that this alternative could be implemented in 2 - 5 months. The current practice of disposing of extracted groundwater at a Class I facility would be continued until this alternative could be implemented.

  It is estimated that design and construction of Alternative 1 would take 6 to 9 months. The current practice of disposing of extracted groundwater at a Class I facility would be continued until the pretreatment plant is on-line.

- Compatibility

  Alternatives 2 and 3 are judged to be equal with respect to compatibility with the future remedy and to have a slight advantage over Alternative 1 since they can both be discontinued or modified with minimal cost on short notice and do not require a large capital investment.

  While not as easily discontinued as Alternatives 2 and 3, the treatment system for Alternative 1 would be made of pre-fabricated components which may be modified to accomodate changes in waste characteristics and flow quantities. Pending the results of the full-scale RI/FS, the the treatment plant may be adapted to operate as a component of the final remedy.

  Alternative 3 is less flexible than Alternatives 1 or 2 in accomodating changes in waste characteristics and flow quantities since Class II-1 facilities can only accept specified types and quantities of wastes.

- Reliability/Risk of Failure

  Onsite: Due to the complexity of operations of a treatment plant, Alternative 1 may have a greater risk of failure than Alternatives 2 and 3 which only require extraction and loading activities at the site.

TABLE 3
SUMMARY OF COSTS AND EFFECTIVENESS EVALUATION
STRINGFELLOW, CA

Alternative	Cost ($1,000)* Capital	Present Worth	Public Health Considerations	Environmental Considerations	Technical Considerations	Public Comment
1. Pretreatment Followed by Discharge to a POTW	$1,240	$9,189**	- Will effectively prevent migration of additional contamination thereby reducing the future threat to public health in the nearby community; Minimal or no threat to public health in communities served by the receiving POTW.	- Will effectively remove contaminated groundwater from the site. - Low potential for adverse impacts due to: transport of treated effluent; secondary treatment at the receiving POTW; and dilution with marine discharge.	- Proven technology utilized onsite and at receiving POTW. - Relatively complex operations required onsite and at receiving POTW. - Risk of Failure for onsite operations greater than for Alternatives 2 & 3; Risk of Failure during transport less than Alternatives 2 & 3; Greater reliability at receiving facility. - Six to nine months to implement. - Process components easily modified to accomodate changes in waste characteristics and flow quantities.	- Supported by community.
2. Disposal at Class I Facility	----	$14,660	- Will effectively prevent migration of additional contamination thereby reducing the future threat to public health in the nearby community; May present public health hazard to other communities in the event of mishandling during transport or disposal.	- Will effectively remove contaminated groundwater from the site. - Potential for adverse impacts related to highway spills or accidents; Potenial for adverse impacts related to improper or inadequate disposal at receiving facility.	- Proven technology. - Low complexity of operations onsite and at receiving facility. - Risk of failure low for onsite operation; potentially high during transport and at receiving facility. All but two Class I facilities in California have confirmed significant (class 1) RCRA violations. - Two to four months to implement. - Easily discontinued.	- Limited comment: Less acceptable than Alternative 1.

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TABLE 3 continued
SUMMARY OF COSTS AND EFFECTIVENESS EVALUATION
STRINGFELLOW, CA

Alternative	Cost ($1,000)* Capital	Present Worth	Public Health Considerations	Environmental Considerations	Technical Considerations	Public Comment
3. Disposal at Class II-1 Land Disposal Facility	----	$ 9,770	- Will effectively prevent migration of additional contamination thereby reducing the future threat to public health in the nearby community; May present public health hazard to other communities in the event of mishandling during transport or disposal.	- Will effectively remove contaminated groundwater from the site. - Potential for adverse impacts related to highway spills or accidents; Potential for adverse impacts related to improper or inadequate disposal at receiving facility.	- Proven technology. - Relatively low complexity on site and at receiving facility. - Risk of failure low for onsite operations; potentially high during transport and at receiving facility. - Two to five months to implement. - Easily discontinued. Less flexible than Alternatives 1 and 2 in accomodating changes in waste characteristics and flow quantities.	- Limited comment: Least acceptable alternative.

* Costs based on 60 gpm continuous flow, 3 years, 10% annual interest, no facility salvage value, monthly payments. Note that the costs presented do not include the cost of the following elements which are common to each alternative and were described on page 15: additional storage capacity, gunite channel extensions piping and additional interception and monitoring wells. The total estimated cost of these items is $1,023,000.

** Cost does not include disposal of sludge; this cost is considered insignificant in relation to the total cost of the alternative. The preliminary cost estimate for sludge disposal is $35,000/year.

During Transport: Since untreated waste must be transported for about 210 miles for Alternative 2 and about 170 miles for Alternative 3, these alternatives have relatively greater risks of failure than Alternative 3 during transportation due to the greater potential for traffic accidents.

The risk of failure for Alternative 1 is low since pretreated effluent is only transported for a distance of about 15 miles and conveyance of the pretreated waste once it reaches the sewer system is considered to be of extremely low risk.

Receiving Facility: Alternative 1 is most likely to consistently provide the level of operation and maintenance required to assure effective, safe handling of wastewater. In the past, some Class I and II-1 Land Disposal facilities have violated RCRA groundwater monitoring and surface impoundment containment and maintenance requirements. To date, all but 2 Class I facilities have substantial (class 1) RCRA violations. Thus, Alternatives 2 and 3 are considered to be less reliable than Alternative 1.

- Level of Site Cleanup

All three alternatives would effectively attain site cleanup since they entail removal of contaminated groundwater from the site and effectively prevent migration of additional contamination downgradient.

Alternative 1 may result in a greater level of overall clean-up since the waste is treated in two stages. First, the on-site facility will remove a large amount of contaminants to meet discharge requirements of the receiving POTW. Second, the water will be treated again at the POTW prior to ocean discharge.

- Community Impact

Since all three alternatives entail removal of contaminated groundwater from the site and effectively prevent migration of additional contamination downgradient, all three alternatives would have positive impacts on the community of Glen Avon and other neighboring communities.

Alternatives 2 and 3 may adversely affect other communities in the event that improper or inadequate disposal and/or transport results in contamination of groundwater or surface water.

Alternative 1 is not expected adversely affect the community in which the POTW receiving pretreated effluent is located since this effluent will be similar to or less hazardous than effluent from other industrial sources and only represents a small percent of the POTW's capacity.

Alternative 1 is generally supported by the community, Alternative 2 is less acceptable and Alternative 3 is the least acceptable.

- Technology Status

All three alternatives utilize proven, commonly practiced technologies that when properly maintained and operated are effective.

- Potential Environmental Impacts

Onsite: All three alternatives will have positive environmental impacts at the site since all three entail extraction of contaminated groundwater and thereby prevent migration of additional contaminants.

During Transportation: Concern for spills or exposure during transport of waste to the point of disposal is great. In the event of an accident during transportation, Alternatives 2 and 3 have relatively greater potentials for adverse environmental impacts since untreated water will be transported. A spill could result in contamination of soil, surface water and/or groundwater.

Ultimate Disposal: Under Alternative 1 treated effluent would ultimately be discharged to the ocean. In the event of a failure of the onsite treatment facility or the POTW, or both, this alternative can be expected to have minimal adverse environmental impacts due to the large dilution factor of marine discharge. In addition, water will be treated twice prior to marine discharge under Alternative 1.

Alternatives 2 and 3 are more likely to cause adverse environmental impacts in the event of inadequate or inappropriate disposal of Stringfellow groundwater at the receiving facilities since contaminated water may percolate to groundwater.

Alternative 1 would generate sludge during the pretreatment process. This sludge will be disposed of in a Class 1 landfill. Alternative 1 would use activated carbon that becomes contaminated during the treatment process. This "spent" carbon will be regenerated by high temperature incineration for reuse.

- Complexity of Operation

Onsite: Alternatives 2 and 3 have the least complex operation requirements for onsite activities since only pumping and storage is required. Alternative 1 requires more sophisticated operation activities.

Receiving Facility: The receiving facilities for all three alternatives have O & M procedures in place since they are

operating facilities, thus this factor is considered relatively insignificant.

- Cost

Cost estimates were calculated for each of the alternatives based on the following assumptions:

- 60 gpm average continuous flow (31,536,000 gallons/year)
- 3 year operations
- 10% interest rate
- no facility salvage value

Alternative 1: Treatment plant capital and operations cost estimates for were prepared by CH2M Hill in the Fast Track RI/FS. Transportation and disposal cost estimates were made on the basis of information received from SAWPA and CBMWD since completion of the Fast Track RI/FS. Note that the cost of sludge disposal at a Class I Land Disposal facility is considered to be insignificant relative to the overall cost of this alternative and was not included in the following cost estimates.

Capital Cost ($0.015/gal):	$1,240,000
Operation Cost ($0.055/gal):	1,724,000/year
Transportation ($0.023/gal) & Disposal to POTW ($0.020/gal):	1,356,000/year
Present Worth Total 3 Year Cost:	$9,189,000

Alternative 2: Cost estimates are based on the current cost of extraction and disposal.

Extraction & Disposal Cost ($0.18/gal):	$5,676,000/year
Present Worth Total 3 Year Cost:	$14,660,000

Alternative 3: Extraction and disposal estimates were based on preliminary pricing cost data received from EPC.

Extraction & Disposal Cost ($0.12/gal):	$3,780,000
Present Worth Total 3 Year Cost:	$9,770,000

Based on the foregoing calculations, Alternative 1 is the least cost alternative and is less expensive than both Alternatives 2 and 3.

COMMUNITY RELATIONS

A community relations plan (CRP) was developed by DOHS in June, 1983. The State is planning to apply for a cooperative agreement amendment to implement the alternative approved in this Record of Decision. A revised CRP may be included in the amendment application. A more comprehensive update will be completed in

the fall of 1984.

A Stringfellow Advisory Committee (SAC) was established by DOHS in September, 1983. The SAC consists of representatives from community groups, elected officials, County and State agencies and EPA. The first SAC meeting was held on September 23, 1983. SAC meetings are held on a monthly basis.

Funding for a Community Technical Advisor (CTA) was provided in the cooperative agreement. The CTA will provide the community with technical review services throughout the RI/FS. SAC members were actively involved in the selection process; they interviewed the top three candidates in February, 1984 and made a recommendation to DOHS. The consulting firm, Environ, was selected to be the CTA. SAC members were also involved in the selection of the RI/FS contractor. They interviewed six of the firms submitting proposals and provided comments to the State.

The following documents have been delivered directly to SAC members for review and comment:

- RI/FS proposals
- RI/FS contract
- CTA Scope of Work
- CTA contract
- Fast Track RI/FS Work Plan
- Final Draft Fast Track RI/FS Report,
- Final Fast Track RI/FS Report
- Electro-magnetic Conductivity Survey
- Final Draft FIT Monitoring Well Completion Report
- Final FIT Monitoring Well Completion Report
- Final Draft FIT Site Summary Report
- SAWPA proposal
- selected RI/FS workplans
- fact sheets

The period for public comment for these documents ranged from one to three weeks. The aforementioned documents were also made available to other public agencies. Many of these documents were made available to the public at large and to potentially responsible parties in the Stringfellow case.

The final draft Fast Track report was made available for Intergovernmental Review from April 12, 1984 to May 22, 1984. The final Fast Track report was available for public review from May 21, 1984 to June 8, 1984. A notification for public comment was advertised in southern California newspapers between May 4, and May 18, 1984.

Briefings on the Fast Track study were held by EPA during the period February 15, 1984 to April 17, 1984 for the following agencies: Orange County Sanitation District, Santa Ana Regional Water Quality Control Board, Santa Ana Watershed Project Authority, Orange County Health Department, Orange County Water Department, U.S. Army Corps of Engineers, Chino Basin Municipal Water District,

Orange County Board of Supervisors, and Los Angeles County Sanitation District. Potentially responsible parties were briefed on February 10, 1984.

A public meeting was held by DOHS in Glen Avon on May 31, 1984. Although EPA was prepared to discuss the Fast Track study, the discussion focused on the radiation data recently released. Although no formal comments were made at the public meeting, the community is generally supportive of the alternative recommended in the Fast Track report.

Written comments on the Fast Track report were received from several agencies and some potentially responsible parties. These comments are addressed in the attached Responsiveness Summary.

CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

Two environmental laws that may apply to the proposed interim measure have been identified. They are the Clean Water Act and the Clean Air Act (§ 118(a) and 17(c); 40 CFR 6.303(b)). RCRA requirements are not applicable at this time, thus a "RCRA alternative" was not developed.

Alternative 1 complies with the Federal pretreatment requirements of the Clean Water Act and local pretreatment standards developed under the authority of the Act. The proposed pretreatment standards are presented in Table 2. The recommended alternative meets these requirements. In addition, the receiving POTW will be in compliance with 40 CFR §270.60 (c).

Alternative 1 was reviewed to determine if requirements of the Clean Air Act apply. If a proposed EPA action may adversely affect air quality, the responsible EPA official is required to consult with appropriate State and local agencies on whether the action conforms with the State Implementation Plan (SIP).

In response to the State Clearinghouse's request to comment on the Stringfellow Fast Track RI/FS, the California Air Resources Board wrote a memo, dated May 10, 1984, stating: "We believe that the recommended remedial actions such as groundwater neutraliztion, lime treatment, filtration, and carbon adsorption will have no adverse effect on air quality". Thus, we have concluded that Clean Air Act requirements are not applicable to the recommended alternative; however, air monitoring may be recommended as a precautionary measure.

Although a "RCRA alternative" was not developed, on-site tanks required by Alternative 1 will be designed to comply with RCRA Part 264 Subpart J.

RECOMMENDED ALTERNATIVE

Section 300.68(j) of the National Oil and Hazardous Substances Contingency Plan (NCP) states that the appropriate extent of remedy shall be determined by the lead agency's selection of the remedial alternative which the agency determines is cost-effective (i.e., the lowest cost alternative that is technologically feasible and reliable, and which effectively mitigates and minimizes damage to and provides adequate protection of public health, welfare, and the environment). Based on evaluation of the cost-effectiveness of each of the proposed alternatives, the comments received from the public and the State, Region IX recommends Alternative 1, Pretreatment Followed by Discharge to a POTW.

Alternative 1 is the least cost alternative. The estimated 3 year present worth of each alternative is listed below:

Alternative 1	$ 9,189,000
Alternative 2	$14,660,000
Alternative 3	$ 9,770,000

Alternative 1 is also considered to be the most effective alternative with respect to public health, environmental and technical considerations. The main points made in the effectiveness evaluation presented previously are summarized below:

- Although all three alternatives provide adequate protection of public health to the communities neighboring the site, Alternative 1 is considered to be more effective overall. In the event of mishandling during transport or disposal, Alternatives 2 and 3 may create a threat to public health to other communities. Alternative 1 is unlikely to present this problem.

- All three alternatives effectively achieve site cleanup by removing contaminated groundwater from the esite. Under Alternative 1, waste will be treated prior to transport and will receive secondary treatment at the receiving POTW prior to marine discharge. Thus, Alternative 1 is considered to have the least potential for adverse environmental impacts.

- Although Alternative 1 has the most sophisticated operational requirements, it is considered to be most reliable overall. In the past, Class I and II-1 Land Disposal facilities have violated RCRA groundwater monitoring and surface impoundment containment and maintenance requirements. Thus, Alternatives 2 and 3 are considered to be less reliable than Alternative 1.

- Alternatives 1 and 2 are expected to be more compatible with future remedial actions than Alternative 3 since Class II-1 facilities can only accept specific types and quantities of waste. Therefore, a change in waste characteristics could require the use of a different Class II-1 facility resulting in a disruption of site operations and potential increase in disposal costs.

- The cost of Alternative I is somewhat less expensive than the next costly alternative, Alternative 3. However, Alternative 3 is more sensitive to future cost growth if the volume of contaminated groundwater increases due to changed site conditions or seasonal variations. Disposal costs for Alternative 3 (and Alternative 2) are directly proportional to volume of groundwater disposed. However, the pretreatment system in Alternative 1 will have reserve capacity built in to accomodate some increase in flows. Therefore, the only Alternative 3 costs associated with increased flow would be higher operational costs that would increase at a lower rate than off-site disposal costs.

- The local community supports Alternative 1.

Two POTW's were identified as potential recipients of Stringfellow water for Alternative 1. Discussions were held with both of these agencies to explore the possibility of this arrangement. The Stringfellow site is located within SAWPA's jurisdiction. SAWPA has submitted a proposal to DOHS for the purpose of implementing the alternative recommended in the Fast Track report. DOHS is supportive of Alternative 1 and has entered into a contract with SAWPA in anticipation of EPA's approval of Alternative 1. DOHS is aware that EPA may not pay for any expenses incurred prior to selection of a remedy through the Record of Decision process.

Capital, operating and disposal cost estimates for the recommended pretreatment system are presented previously. A process flow diagram of the recommended pretreatment system is presented in Figure 3.

Alternative 1 includes offsite disposal of sludge which is consistent with CERCLA §101(24) in that it is part of the most cost-effective remedial action and is necessary to protect public health, welfare and the environment.

OPERATIONS

Annual operation costs in 1984 dollars are presented below.

Item	Annual Cost
Chemicals	$ 75,000
Lime - $30,000/yr Caustic - $40,000/yr	
Polymer - $5,000/year	
Granulated Activated Carbon ($0.045/gal)	1,419,000
Power ($0.09/kWh)	30,000
Operating Labor	150,000
Monitoring	50,000
TOTAL	$1,724,000

Effluent monitoring costs were developed for the following parameters and sampling frequency: (1) Total Organic Carbon (TOC) on a daily basis; (2) metals on a weekly basis; and (3) priority pollutants on a monthly basis.

Given the interim nature of this activity, the costs of operating the treatment plant will be considered an interim offsite remedial measure. EPA will consider funding the operation of the plant on an annual basis, pending availability of funds, until a final remedy is implemented. If the treatment plant is incorporated into the final remedy, EPA's policy to pay for one year of O & M costs will go into effect at that time.

The State of California will pay a 10% cost-share of construction and operational costs. The State's cost-share will be obtained from the State Hazardous Substance Account or from the $4.2 million reimbursement funds paid to the State in the Stringfellow Cooperative Agreement.

SCHEDULE

EPA anticipates the following schedule:

- Approve Remedial Action: July, 1984
- Amend Cooperative Agreement for Remedial Design, Construction Management, Site Preparation and Operations: 4th Quarter FY'84
- Begin Design and Site Preparation: 4th Quarter FY'84
- Complete Design and Site Preparation: 1st Quarter FY'85
- Amend Cooperative Agreement for Remedial Action: 1st Quarter FY'85
- Begin Construction: 1st Quarter FY'85
- Plant on line: 2nd Quarter FY'85
- Operations: 2nd Quarter FY'85 - 2nd Quarter FY'88

FUTURE ACTIONS

- Long Term RI/FS

  A full-scale RI/FS was funded under the cooperative agreement with DOHS. JRB Associates (JRB) is conducting the RI/FS for the State. The study commenced in March, 1984, and will be concluded in October, 1985. JRB will conduct studies to identify and evaluate methods to prevent or manage upgradient groundwater and surface water entering the site, to prevent migration of hazardous substances offsite, to define aquifer characteristics, the extent of the contaminant plume, and methods of controlling migration. JRB will develop a cost-effective remedial action for final site closure.

- Interagency Agreement (IAG)
  Through an IAG, the US Army Corps of Engineers will provide EPA with technical assistance during remedial design of the interim measure approved in the Record of Decision and during the full-scale RI/FS.

- Remedial Action
  Upon completion of the RI/FS, remedial design and remedial action will be implemented for final site closure. It is anticipated that the State of California will apply for an amendment to the cooperative agreement to implement final site closure. The State will be expected to provide a 10% cost-share for remedial action activities. It is anticipated that a ROD for this purpose will be approved early in 1986.

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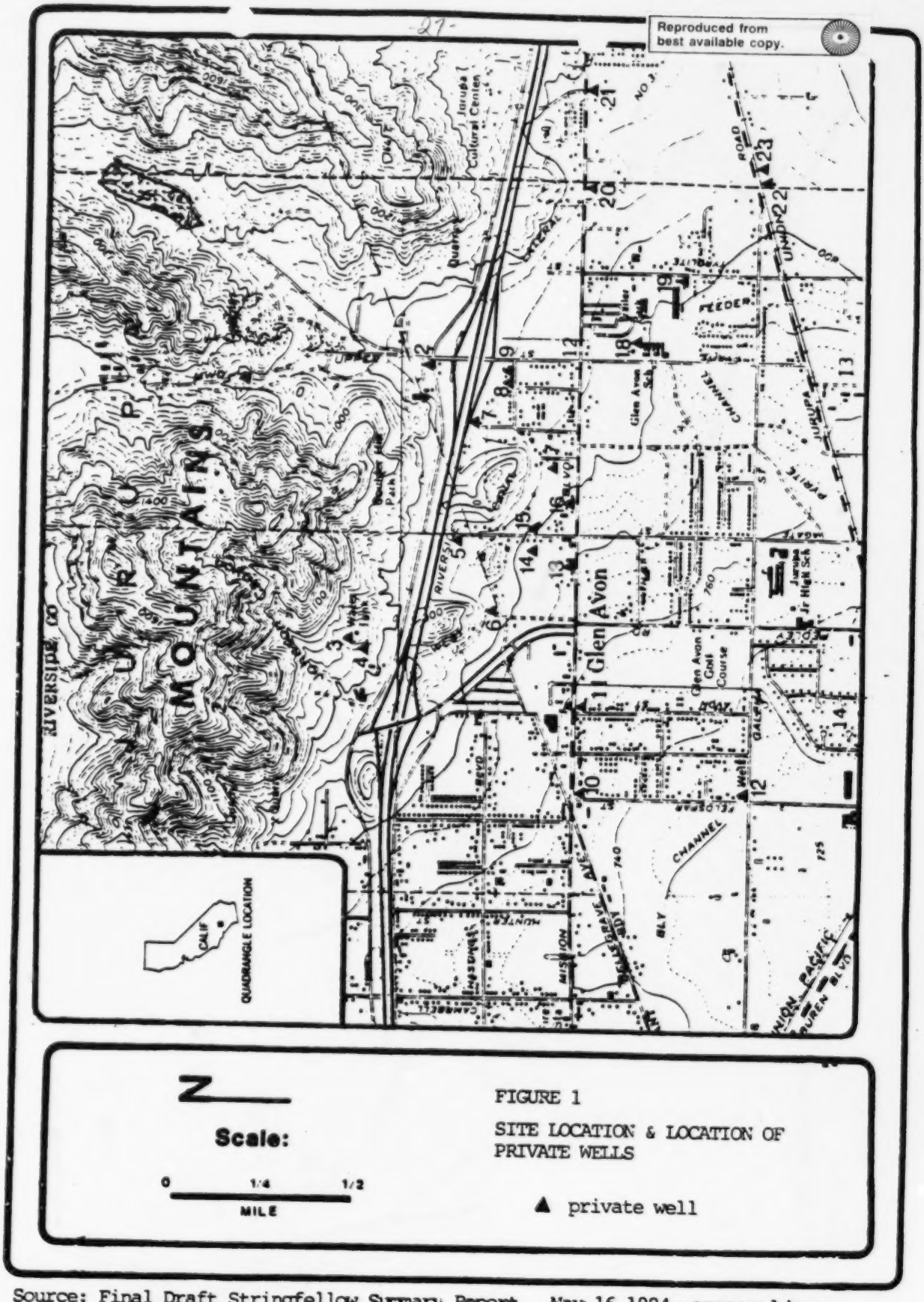
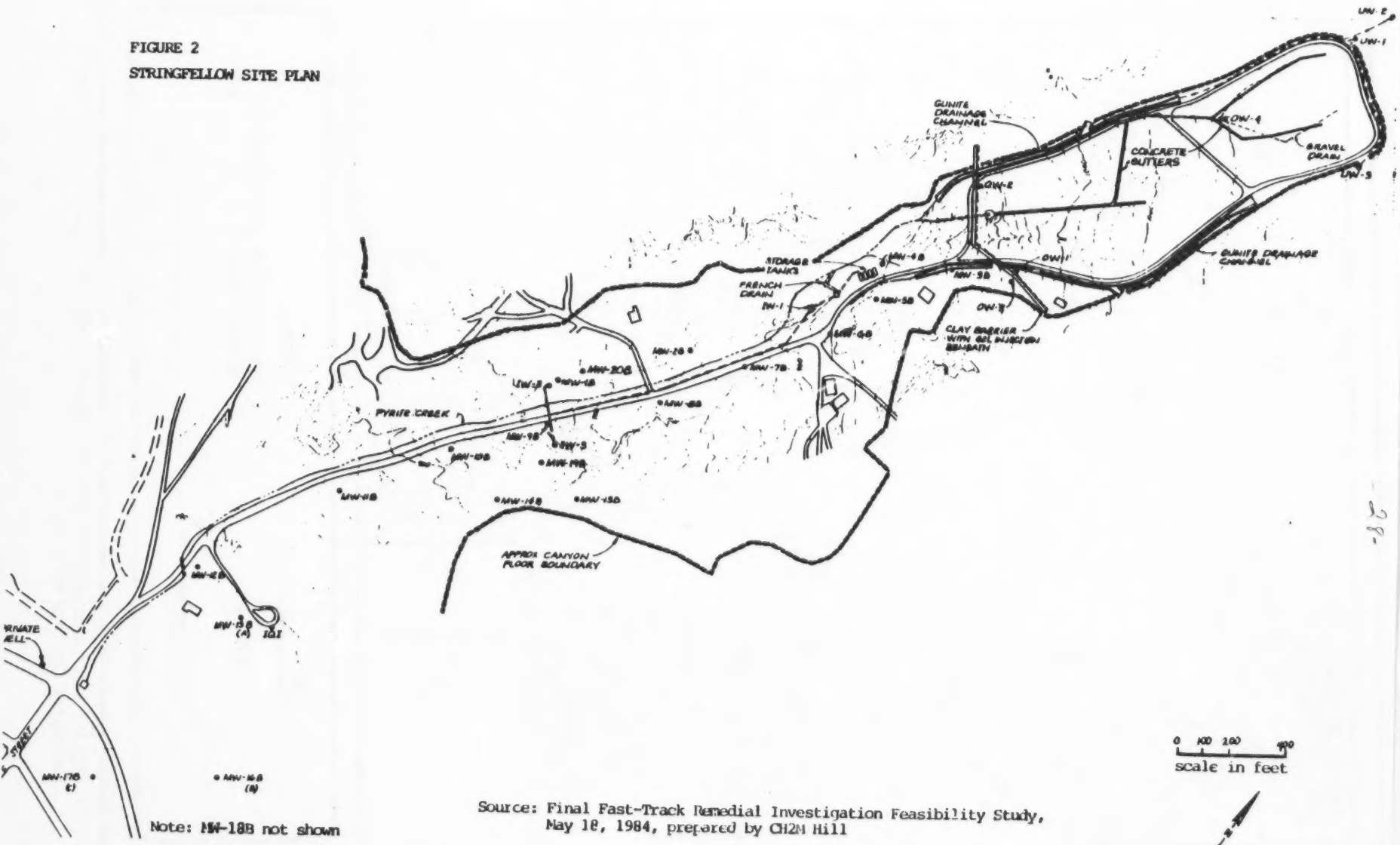


Source: Final Draft Stringfellow Summary Report, May 16,1984, prepared by Ecology & Environment, Inc.

FIGURE 2

STRINGFELLOW SITE PLAN

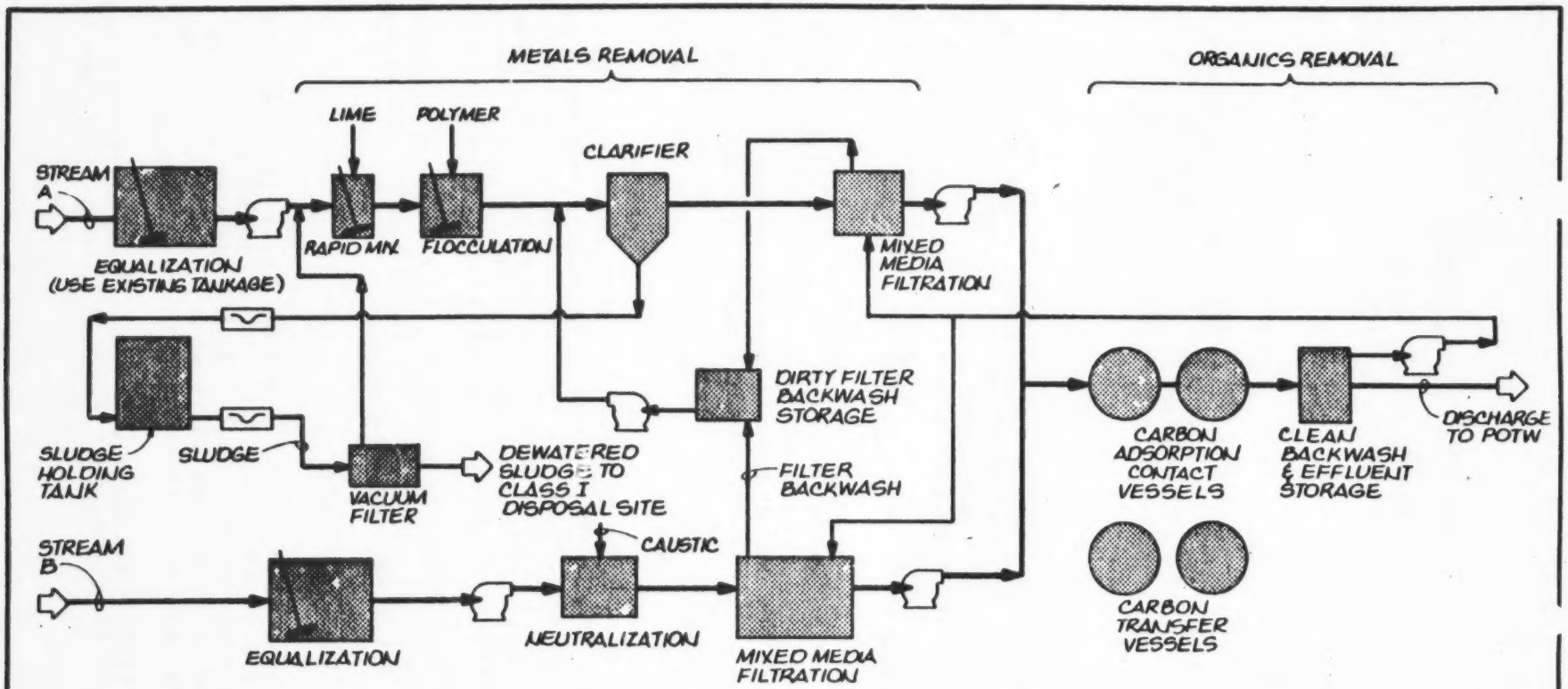


Note: MW-18B not shown

Source: Final Fast-Track Remedial Investigation Feasibility Study, May 10, 1984, prepared by CH2M Hill

FIGURE 3

PROCESS FLOW DIAGRAM RECOMMENDED PRETREATMENT SYSTEM



NOTES:

1. STREAM A IS FROM WELLS OW-1, OW-2, OW-4, IW-1 AND THE FRENCH DRAIN. AVERAGE FLOW IS EXPECTED TO BE 20 GPM. DESIGN FLOW IS 50 GPM.
2. STREAM B IS FROM MID-CANYON WELLS IW-2 & IW-3. AVERAGE FLOW IS EXPECTED TO BE 40 GPM. DESIGN FLOW IS 80 GPM.
3. TREATED GROUNDWATER WILL BE HAULED AND DISCHARGED TO A POTW.
4. TREATABILITY STUDIES ARE REQUIRED TO CONFIRM SYSTEM CONFIGURATION & DEFINE DESIGN PARAMETERS.

Source: Final Fast-Track Remedial Investigation Feasibility Study, May 18, 1984, prepared by CH2M Hill

RESPONSIVENESS SUMMARY

STRINGFELLOW SITE
Riverside, California

I. INTRODUCTION

This responsiveness summary addresses the comments made by governmental agencies and the public concerning the Fast Track Remedial Investigation/Feasibility Study (Fast Track) report for the Stringfellow Site, Riverside, California, issued May 18, 1984.

REVIEW PROCESS

The final draft and the final report were available for public review and comment to three Riverside County public libraries. The final report was also distributed to public libraries in Los Angeles and Orange County; availability of the report was noticed in the Los Angeles Times, the Riverside Press Enterprise, and the Santa Ana Register.

Copies of both reports were mailed directly to local agencies, the Stringfellow Advisory Committee (SAC), and counsel to selected potentially responsible parties. Written comments on the final draft were received from the Orange County Water District, the California Department of Health Services (DOHS), the California Air Resources Board, and the California Department of Transportation. Comments on the final draft were incorporated into the final report.

Written comments on the final report were received from the California Department of Health Services, the Santa Ana Regional Water Quality Control Board, the Santa Ana Watershed Project Authority (SAWPA), the U.S. Army Corps of Engineers, and counsel to the potentially responsible parties. Comments on the final report and EPA's responses are summarized below.

A list of all comments is attached. Copies of comments received on the final draft and the final report are available at EPA-Region 9 and EPA-Headquarters.

OBJECTIVES OF THE FAST TRACK

Several commentors seem to confuse the objectives and scope of the Fast Track study with those of the full-scale Remedial Investigation/Feasibility Study (RI/FS) which is being conducted by DOHS, and which will address the entire spectrum of problems associated with the Stringfellow site.

The Fast Track is a focused effort designed to address specific aspects of the overall problem within a shorter time

than the full-scale RI/FS. The recommendations developed in the Fast Track study are to be implemented for the interim period prior to completion of the full-scale RI/FS and construction of the final remedy.

As stated in the report, the primary objectives of the Fast Track study are to:

- Develop data on downgradient migration of contamination to assess public health endangerment.
- Develop criteria for mid-canyon interception of contaminated groundwater as a means of mitigating identified public health endangerment.
- Identify and evaluate alternative methods for management and disposal of contaminated water collected from onsite and down-gradient wells.
- Develop a plan for implementation of the most cost-effective alternative for management and disposal of contaminated water collected from onsite and downgradient wells.

Other aspects of assessing hazards and determining cost effective remedial actions are included within the scope of the full-scale RI/FS.

II. COMMENTS AND RESPONSES

GROUNDWATER FLOW IN THE BEDROCK

The commentors contend that bedrock could be a pathway for flow of groundwater and transport of contaminants. The Agency agrees that contaminants could be moving through fractures and weathered zones in the bedrock. However, the existing database is insufficient to examine this possibility. Definition of the bedrock hydrogeology represents a sizeable and time consuming data-collection effort. Consequently, this could not have been included within the scope of the Fast Track study. As was stated in the Fast Track report, these data will be collected during the RI/FS.

GROUNDWATER QUALITY

The commentors have various concerns regarding the groundwater quality database used in conducting the Fast Track study. In general, these concerns result from a failure to recognize the purposes of the database and the distinctions between the Fast Track study and the RI/FS. The groundwater database has been valuable in (a) increasing the Agency's understanding of the areal extent of contamination, (b) assessing the endangerment to the public, (c) designing the RI/FS, and (d) designing interim remedial facilities. Considerably more data must be collected during the RI/FS to

define the areal and vertical extent of contamination and appropriate long-term remedies.

The commentors state that there has been an incomplete and inadequate analysis and evaluation of all the data. The Fast Track report did not provide an exhaustive review of all data collected (i.e., greater than 30,000 data points), because it was designed to be limited in scope and to result in the selection of interim remedies. The conclusions reached by the Fast Track report are supported by the groundwater quality database. Substantially more data gathering and analysis will be conducted in the full-scale RI/FS for selection of the cost-effective final remedies.

The commentors state that no analysis of pre-1983 data was performed. These data are limited in comparison to the extensive data that have been collected in 1983, particularly for organics and metals. The pre-1983 data, though not exhaustively reviewed in the Fast Track report, support the conclusions of the report.

The commentors state that the groundwater data collected did not provide all the necessary data for designing the recommended pretreatment facilities. Samples collected during 1983 were analyzed for a broad spectrum of constituents (approximately 140 parameters per sampling) with major emphasis on potential adverse health effects. Many of these same data are useful in designing pretreatment facilities recommended by the Fast Track report. Additional data, such as TOC, COD, BOD, and TSS, are necessary for pretreatment design purposes, and are currently being collected as part of the treatability study that is recommended by the Fast Track report.

The commentors state that the analytical scatter and inconsistencies in the data negated its usefulness. Sampling from April through November 1983 resulted in over 30,000 pieces of data. Considerable efforts were expended by the Agency to obtain these data using standardized sampling and analytical procedures. The overall sampling results demonstrate consistent patterns and strongly support the recommendations of the Fast Track report.

MID-CANYON HYDROGEOLOGY

The commentors state that considerable uncertainty still exists regarding the hydrogeology of the alluvial aquifer in Pyrite Canyon. Uncertainty does exist and will be addressed in the RI/FS; however, the following is certain:

- A large volume of contaminated groundwater exists upgradient of mid-canyon; and
- The direction of groundwater movement is down-canyon, toward Glen Avon.

Therefore, interception at mid-canyon of contaminated groundwater will reduce the threat to groundwater supplies downgradient of Stringfellow.

The commentors criticize the estimate of groundwater velocity as based on only a few permeability measurements in a heterogeneous aquifer. The Agency agrees that it would be better to have more permeability estimates. However, the potential threat to downgradient groundwater supplies dictates that a decision be based on existing data. It is reasonable to estimate the average groundwater velocity based on the average of the measured permeabilities.

The commentors express concern regarding the scatter in the permeability data. A wide range in permeabilities is typical of heterogeneous alluvial deposits. Clay strata or cemented alluvium would have a low permeability while sand or gravel strata would have a high permeability. If high permeability sand and gravel deposits are interconnected, the velocity of some contaminated water would be faster than the average velocity estimated in the Fast Track report.

The commentors express concern regarding the assumption that trichlorethene (TCE) and chloroform would move at the same rate as groundwater. The mobility of organic contaminants may be affected by physical, chemical or biological processes. However, no data exist to assess the effects, if any, of these processes in Pyrite Canyon. Experience at other sites throughout the U.S. has conclusively demonstrated the mobility of TCE in groundwater. When assessing the potential threat to public health, it is necessary to make conservative assumptions; consequently it is reasonable to assume that constituents such as TCE and chloroform move at the same rate as groundwater.

The commentors criticize the aquifer testing program in the Fast Track study, stating that only step drawdown tests were used. This is incorrect. The Fast Track study included a 24-hour, constant-discharge aquifer test as well as four step-drawdown tests. The 24-hour test was the longest aquifer test performed in the mid-canyon. The Fast Track report recommends that further testing be performed in the mid-canyon to refine determinations of the long-term response to pumping. Such testing has recently been performed in the mid-canyon using MW-19, IW-2, and IW-3.

The commentors state that it has not been demonstrated that the interceptor wells will fully capture the contaminants moving through the mid-canyon. The Agency believes that additional hydrogeologic testing will be required to demonstrate that the mid-canyon groundwater interception system fully captures contaminants moving through mid-canyon. However, it is certain that pumping existing interceptor wells will remove contaminated groundwater that would otherwise move

downgradient toward Glen Avon. Removal of these contaminants will significantly reduce the threat posed to groundwater supplies. In view of this threat, installation of an operational interception system should not await the resolution of all uncertainties regarding groundwater movement in the canyon.

ALTERNATIVE METHODS OF CONTROLLING CONTAMINANT MIGRATION

The commentors state that there may be better ways of controlling the groundwater than by mid-canyon extraction. The Agency agrees that means other than mid-canyon extraction have merit for controlling migration of groundwater contaminants. Three pump barrel wells (UW-1, UW-2, and UW-3) and a springbox have been installed upgradient of the site to intercept additional uncontaminated groundwater and to prevent it from conveying contaminants from the site. The anticipated effect of pumping these wells will be a reduction in the current pumping requirements from the onsite wells. The RI/FS contractor is presently developing an operation plan for the pump barrel wells. Upgradient interception of uncontaminated water is also a primary objective of the RI/FS.

The commentors urge that as much contaminated water as possible be extracted from the site in order to remove water with the highest levels of contamination. EPA agrees with this approach. The Fast Track report recommends continuing the present onsite pumping program at wells OW-1, OW-2, OW-4, IW-1 and the French Drain. In addition, pumping at mid-canyon is recommended in order to capture contaminants which have already migrated beyond the influence of onsite wells.

The commentors argue that surface water diversion was not considered as an alternative remedial measure. Infiltration of surface water is a potential source of recharge of both contaminated and uncontaminated water throughout Pyrite Canyon. Diversion of surface runoff may be a component of the final remedy to be employed at the site. To determine the need for and to design additional surface water diversion structures extending down-canyon requires knowledge of the precipitation characteristics of the site itself and a better definition of the site water budget. These data do not exist and their collection would require an extensive hydrologic monitoring program which will be performed during the RI/FS.

CAPTURE OF DOWNGRADIENT CONTAMINANTS

The commentors point out that the mid-canyon interceptor well system will not reverse contaminant flow or remove contaminants that have already migrated past this mid-canyon area. The Fast Track report definitively acknowledges this problem. However, as indicated above, the objectives of the Fast Track study are limited. The RI/FS will investigate the extent of contaminant migration past the mid-canyon area and

the need for remedies. Because the bulk of the known contamination is still upgradient of the mid-canyon, interception of groundwater from the mid-canyon will prevent the further deterioration of groundwater quality past this area.

PRETREATMENT STANDARDS

The commentors have questioned the need to pretreat extracted groundwater prior to discharge to a regional interceptor. As described in the Fast Track report, each of the three candidate Publicly Owned Treatment Works (POTW) systems for disposal of Stringfellow water has established quality limitations for discharges into its system. Untreated Stringfellow groundwater exceeds the quality limitations of all three of the systems and could not be discharged to any one without pretreatment. Discussions between EPA and Santa Ana Watershed Project Authority (SAWPA), County Sanitation Districts of Orange County (CSDOC), Chino Basin Municipal Water District (CBMWD), and Los Angeles County Sanitation Districts (LACSD) have confirmed this determination.

The commentors have challenged the appropriateness of the proposed pretreatment standards and suggested that acceptable water quality requirements for discharge of extracted groundwater to regional interceptors be obtained or negotiated. As described in the Fast Track report, the operator of a regional interceptor (SAWPA or CBMWD, in this case) must obtain concurrence from the receptor POTW (CSDOC or LACSD) for all industrial wastes admitted into its system. The POTW may deny a permit for discharge that it believes could adversely affect the operation of its treatment plant, or which could affect compliance with its NPDES permit requirements. The burden of establishing that no adverse effects will result falls upon the waste generator. It was with these considerations in mind, and after discussing the matter with representatives of SAWPA, CSDOC, CBMWD, and LACSD, that EPA adopted the approach presented in the Fast Track report for developing the proposed pretreatment standards.

The commentors also suggest the EPA did not contact SAWPA to discuss the requirements for discharge of Stringfellow water into the SARI line. This is not correct. From the start of the Fast Track study in September 1983, EPA has worked with SAWPA to define a mutually satisfactory basis for discharging Stringfellow water into the SAWPA system.

EVALUATION OF ALTERNATIVES

The commentors state that the Fast Track study should have relied more heavily upon a matrix analysis for the comparison of alternatives. The Fast Track study employed methods of analysis which are consistent with the intent of the NCP and EPA guidance. Several alternatives discussed and

not recommended by the Fast Track report, as well as combinations of portions of these alternatives, remain under consideration in the full-scale RI/FS. Given the objectives and limited scope of the Fast Track study, these alternatives were not appropriate for further consideration as interim measures.

The commentors state that solar evaporation and air stripping should have been more thoroughly evaluated in the Fast Track study. The primary reason for eliminating solar evaporation during the initial screening process was that no available, suitable land area was identified. Establishment of surface impoundments for solar evaporation either in Pyrite Canyon or else where in the vicinity was judged to be unacceptable to the surrounding community. It should be noted that the existence of the Stringfellow site as an uncontrolled hazardous waste site is due to a failed attempt at solar evaporation. A second attempt at onsite solar evaporation was anticipated to be contested by the comunity and local agencies and could preclude implementation of this alternative in the three to five year interim period of the full-scale RI/FS and the construction of the final remedy.

Air stripping was rejected as a suitable pretreatment operation primarily because it is capable of removing only volatile organic compounds (VOC). It is not effective for removing acid or base-neutral extractable compounds, which are also present in the Stringfellow groundwater. It was also rejected because of its potential for VOC emissions. The length of time needed to study the potential VOC emission was beyond the scope of the Fast Track study and will be included in the RI/FS.

ADDITIONAL STUDIES

The commentors assert that the Fast Track study is deficient due to the lack of treatability work and long-term pump testing of the aquifer in the mid-canyon region. Both of these studies were recommended in the Fast Track report as the next required activities and have been conducted.

TRICHLOROETHENE

A commentor stated that the organic chemical "trichloroethene" referred to in the Fast Track report does not exist. The commentor expresses a familiarity with "trichloroethylene" and apparently is unaware that the terms, "trichloroethene" and "trichloroethylene" are synonomous. The proper name for the compound in question, C_2HCl_3, under the "Geneva system" adopted by the International Congress held at Geneva, Switzerland, in 1892, is trichloroethene. This system, which covers the primary phases of the nomenclature of organic chemistry, has been repeatedly reaffirmed and extended since its inception.

LACK OF ADHERENCE TO THE WORK PLAN

The commentors state that the primary objectives of the Fast Track study were not accomplished and that discrepancies between the work plan and the work as presented in the final report compromised the quality of the study. Although certain elements of the scope of work were not performed as originally described, the primary objectives of the work plan have been fully met. Changes were made according to the exigencies of the work as it progressed. In some cases, items of the work plan became impossible to perform within the scope of the project. For example, negotiations with SAWPA could not be completed before completion of the Fast Track study and are continuing with EPA and DOHS.

PAST REPORTS

The commentors state that the Fast Track study failed to refer to past reports and data. The Fast Track study reviewed and, as appropriate, utilized previously generated reports and data on the Stringfellow site. Previous studies, such as those conducted by J.M. Montgomery, Consulting Engineers, Inc., while providing useful insight, were often out-of-date or did not consider information now available. For example, in a 1981 report, J.M. Montgomery recommended discharge to the SARI line, but assumed that an extension line would be constructed to within one mile of the site, allowing a direct connection from an onsite treatment plant to the extension line. In fact, this extension line has not been built.

OTHER AGENCIES' COMMENTS

Comments received from the Hazardous Materials Laboratory Section of California Department of Health Services were detailed and largely consisted of editorial suggestions. Many of these have merit, but overall do not alter the conclusions presented in the Fast Track report.

The Santa Ana Regional Water Quality Control Board, California Department of Transportation, and California Air Resources Board have each concurred in the recommendations of the Fast Track report. The California Department of Transportation stressed that adequate consideration be given to potential hazards associated with truck hauling of untreated hazardous wastes. The California Air Resources Board noted that additional study would be required if air stripping were to be considered further.

Comments received from the U. S. Army Corps of Engineers generally cover the same topics discussed by other commentors. Responses previously presented in this document address these comments.

III. CONCLUSION

The comments received were helpful, but were not of a nature to cause a revision in the findings of the study.

The Santa Ana Watershed Project Authority (SAWPA) has submitted a proposal to DOHS under which SAWPA would implement the alternative recommended in the Fast Track report. SAWPA is one of the sewerage authorities recommended by the Fast Track report for disposal of the pretreated groundwater. In anticipation of EPA's approval of the remedy recommended by the Fast Track report, DOHS has entered into the first phase of a contract with SAWPA for contractor procurement. Following this first phase of the overall program, DOHS plans to enter into additional contracts with SAWPA for contract management, design, construction and operation of the pretreatment plant.